Biological Evaluation

in support of the
Environmental Assessment

Dixie Drive Interchange Project

Utah Department of Transportation

UDOT Project No. S-I15-1(77)6

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1.0 Introduction

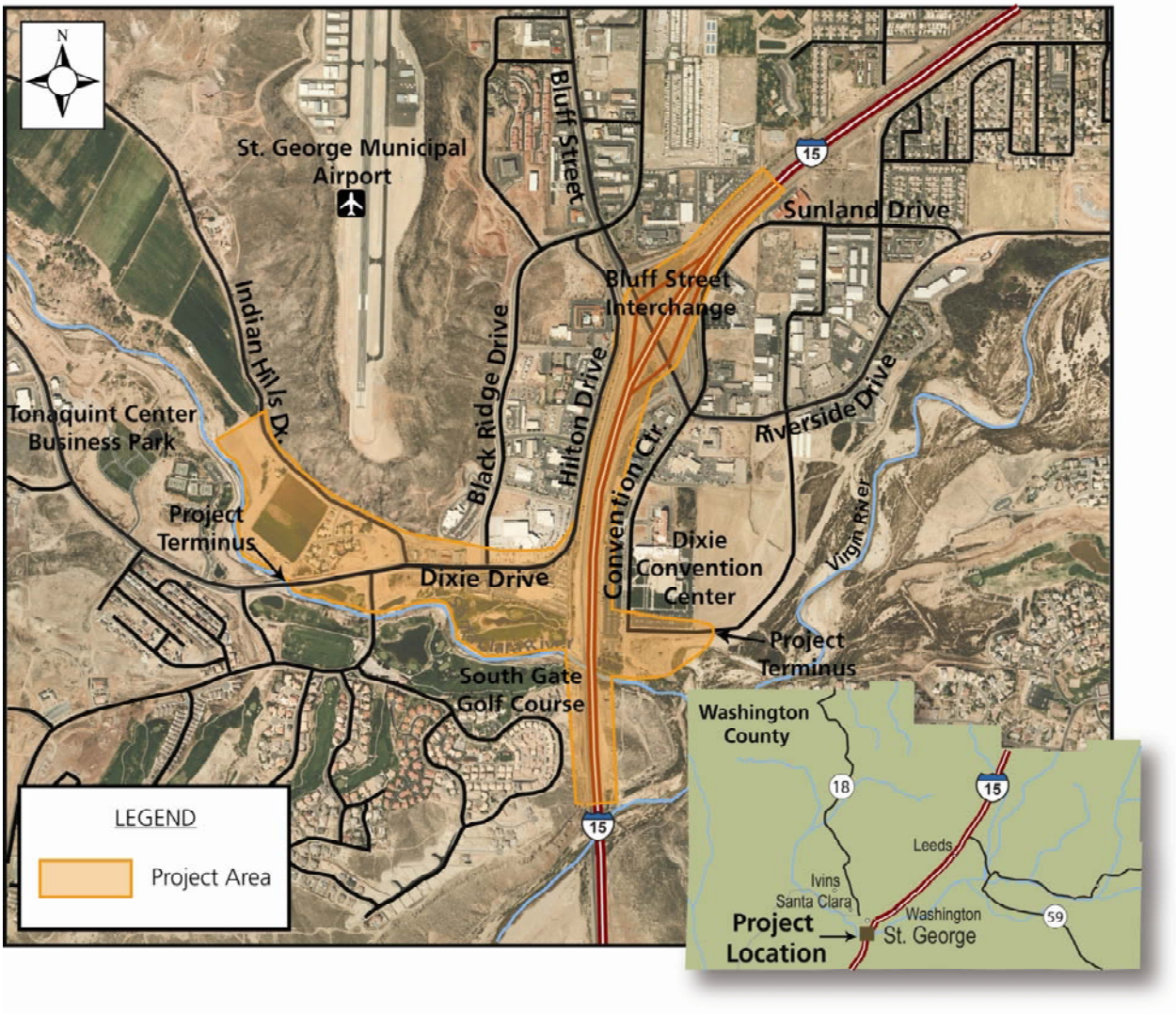
1.1 Purpose and Background

The Federal Highway Administration (FHWA) and the Utah Department of Transportation (UDOT), in conjunction with the City of St. George, propose to construct a new interchange on Interstate 15 (I-15) at approximately Milepost 5 in St. George, Utah (see Figure 1 below). The project area is located in the city of St. George, Washington County, Utah, and includes the I-15 corridor between the Bluff Street interchange and the Virgin River crossing. The Dixie Drive interchange would connect to the Bluff Street interchange through a system of one-way collector-distributor roads. The Dixie Drive interchange would tie into Dixie Drive just before the existing Dixie Drive bridge over the Santa Clara River to the west and at 270 East just behind the Convention Center to the east (see Section 2.0, Description of Proposed Action, for further details).

The purpose of the Dixie Drive Interchange project is to address projected traffic demand and operations for the Bluff Street interchange. The Bluff Street interchange was improved by converting it into a tight diamond urban interchange, which was intended to provide the capacity for the year 2035 travel demand. However, a recent analysis conducted by UDOT and the City of St. George concluded that the improvements to the Bluff Street interchange could service only about 80% of the total demand in 2035. The additional travel demand stems from an increase in population growth, traffic volume growth, economic development, and land development. Therefore, in order to serve the 2035 travel demand, additional capacity would be required outside of the Bluff Street corridor. In order to meet the regional travel demand in the area, a concept was developed to provide a new interchange on I-15 at Dixie Drive. Together, the two interchanges would function as an integrated system to provide enough capacity for the area's travel demands to last beyond the 2035 planning year.

Section 7 of the Endangered Species Act of 1973, as amended, requires federal agencies to ensure that their actions do not jeopardize the continued existence of federally listed or proposed, threatened, or endangered species or result in the destruction or adverse modification of their designated critical habitat. Further, the governing federal agency (in this case FHWA) must consult with the U.S. Fish and Wildlife Service (USFWS) on actions that could affect listed species or their critical habitats. This Biological Evaluation fulfills the requirements of the Endangered Species Act relating to protection of federally listed species during construction and operation of the Dixie Drive Interchange project.

Figure 1. Dixie Drive Interchange Project Location



1.2 Status of Species

Four federally listed or candidate species (two fish and two birds) could be present in the vicinity of the proposed project. Of those four species, three are listed as endangered and one is a candidate for listing under the Endangered Species Act (see Table 1). Generally speaking, these four species are associated with the Virgin River, though two species, southwestern willow flycatcher and Virgin River chub, have previously recorded occurrences in sections of the Santa Clara River outside the action area (see Section 3.0, Project Action Area).

Table 1. Special-Status Species Known To Be Present in the Vicinity of the Proposed Project

Species	Federal Status	Occurrence	Critical Habitat
Southwestern willow flycatcher (*Empidonax trailli extimus*)	Endangered	Known nesting and critical habitat along the Virgin River; past sightings along Santa Clara River outside of action area	Designated. Includes the Virgin River and the confluence with the Santa Clara River.
Virgin River chub (*Gila seminuda*)	Endangered	Known to be present in the Virgin River; one incidental occurrence in the Santa Clara River	Designated. Includes the Virgin River and its floodplain.
Woundfin (*Plagopterus argentissimus*)	Endangered	Known to be present the Virgin River	Designated. Includes the Virgin River and its floodplain.
Yellow-billed cuckoo (*Coccyzus americanus*)	Candidate	Known nesting along the Virgin River outside of action area	Not applicable.

2.0 Description of Proposed Action

2.1 Proposed Project Components

The Dixie Drive Interchange project (see Figure 2 on page 8 below) includes the following elements:

- A new interchange on I-15 at about Dixie Drive (Milepost 5) that would connect to the Bluff Street interchange through a system of one-way collector-distributor roads
- Four new structures over the Santa Clara River
- A new seven-lane road that would connect the Dixie Drive interchange to the road network on the west side of I-15
- The removal of Tonaquint Drive Bridge
- Mitigation for impacts to the South Gate Golf Course and Hilton Drive Trail
- A grade-separated structure for the future extension of Convention Center Drive to the south
- The re-establishment of access to the Confluence Trail trailhead parking lot just south and east of the Dixie Drive interchange
- A new road to just beyond the Dixie Convention Center where it will connect to the existing Dixie Drive to the east

In addition to standard construction equipment (cranes, graders, jackhammers, bulldozers, excavators, etc.), a vibratory pile driver will be used to install new bridge piers and armoring along portions of Dixie Drive.

2.1.1 Upland Construction Elements

Most construction activities would take place in areas that are currently developed, including the existing Southgate Golf Course, commercial properties (landscaped and/or paved), and landscaped park lands. Only a very narrow fringe of riparian habitat would be affected by construction activities. This habitat consists of a mix of native and introduced species around the I-15 bridges and the proposed armoring locations along portions of the new roadway.

Dixie Drive Interchange

The proposed Dixie Drive interchange would consist of a two-span interchange north of the Santa Clara River. The superstructure would consist of precast-pre-stressed concrete girders and cast-in-place concrete substructures. Foundations

are anticipated to consist of drilled shafts, and the bridge deck would be cast-in-place concrete.

2.1.2 In-Water and Streambank Construction Activities

Bridges over the Santa Clara River

The existing I-15 bridges that span the Santa Clara River consist of concrete superstructures and substructures. The piers are wall-type, and abutments are full-retaining. Both structures would be removed and replaced with new, wider structures. A review of the original bridge plans and on-site inspections indicates that the existing bridges constrict the channel. The lead agencies anticipate that the contractor would use traditional methods of removal using a trackhoe/hydraulic hammer to break the concrete into manageable pieces. The pieces would be loaded into dump trucks and hauled to an approved upland disposal location. Existing substructures would be removed at least 2 feet below the river channel.

The lead agencies are proposing in-water cofferdams to isolate the existing substructures and piers within the channel from the active flow of the river and to prevent concrete and construction debris from entering the river. The type of cofferdams (jersey barriers, sandbags, sheet piling, etc.) would be determined by the contractor based on the average flows during the construction period. The agencies anticipate that cofferdams will be feasible, but if not, the river could be routed into a flume to bypass the construction area.

The proposed design includes four new support structures over the Santa Clara River. Two of these structures would replace the mainline structures to be removed as described in Section 2.1, Proposed Project Components. In addition, two new ramp bridges would be constructed to support the new interchange. The lead agencies anticipate that these new bridges would be three-span, with spill-through abutments positioned parallel to the flow to reduce scouring. The abutments would be founded on 2:1 slopes to help open the channel by providing additional flow capacity. At this time, the agencies anticipate that piers would be wall-type unless it determines that the drift potential of the channel is low. If that is the case, multiple round column bents would be constructed. The agencies anticipate that drilled shafts would be used for the foundations.

The superstructures would be either steel girders or precast-prestressed concrete girders. The bridge decks and substructures would be cast-in-place concrete using traditional forming techniques. New girders would not be lower in elevation than the current girders. To the extent possible, new piers or bents would be sited away from the main watercourse; however, at least one and possibly more of the structures are likely to require dewatering below the ordinary high-water mark (OHWM) to construct the features.

The new abutments and the existing trail along the river would be armored using either smooth surface slope protection (concrete walls or metal sheet piling) or riprap. The trail currently has about 8 feet of clearance under the girders, and designs would meet or exceed this clearance.

Bank Protection/Stabilization for the South Side of Dixie Drive

Segments of the Dixie Drive alignment would be located within the floodplain of the Santa Clara River on an existing golf course close to the OHWM. Portions of the south edge of Dixie Drive would therefore need to be stabilized to protect the new roadway during extreme high-flow events. The lead agencies propose to stabilize the riverbank adjacent to the roadway with riprap that is in-planted with native shrub species (willows, for example) or smooth-surface structural elements such as concrete walls or metal sheet piling. Piling, if used, would be driven “in the dry” outside the active channel. The proposed bank stabilization would be placed at existing grades and constructed so that the size and flood-carrying capacity of the existing Santa Clara River channel are maintained.

Removal of Tonaquint Drive Bridge

To mitigate project impacts to the Santa Clara River and its associated floodplain, the Tonaquint Drive Bridge that crosses the Santa Clara River is proposed to be removed as part of the project. Although USFWS would support this action (Abate 2008), further discussion with the City and the Utah Division of Wildlife Resources (UDWR) is required to determine the feasibility of this action. Specific removal actions have not yet been identified, but the lead agencies anticipate that the bridge deck and concrete abutments would be removed during periods of low flow. Adjacent streambanks would be graded to match natural contours, and disturbed areas would be reseeded and planted with native riparian vegetation to restore a more natural connection to the floodplain.

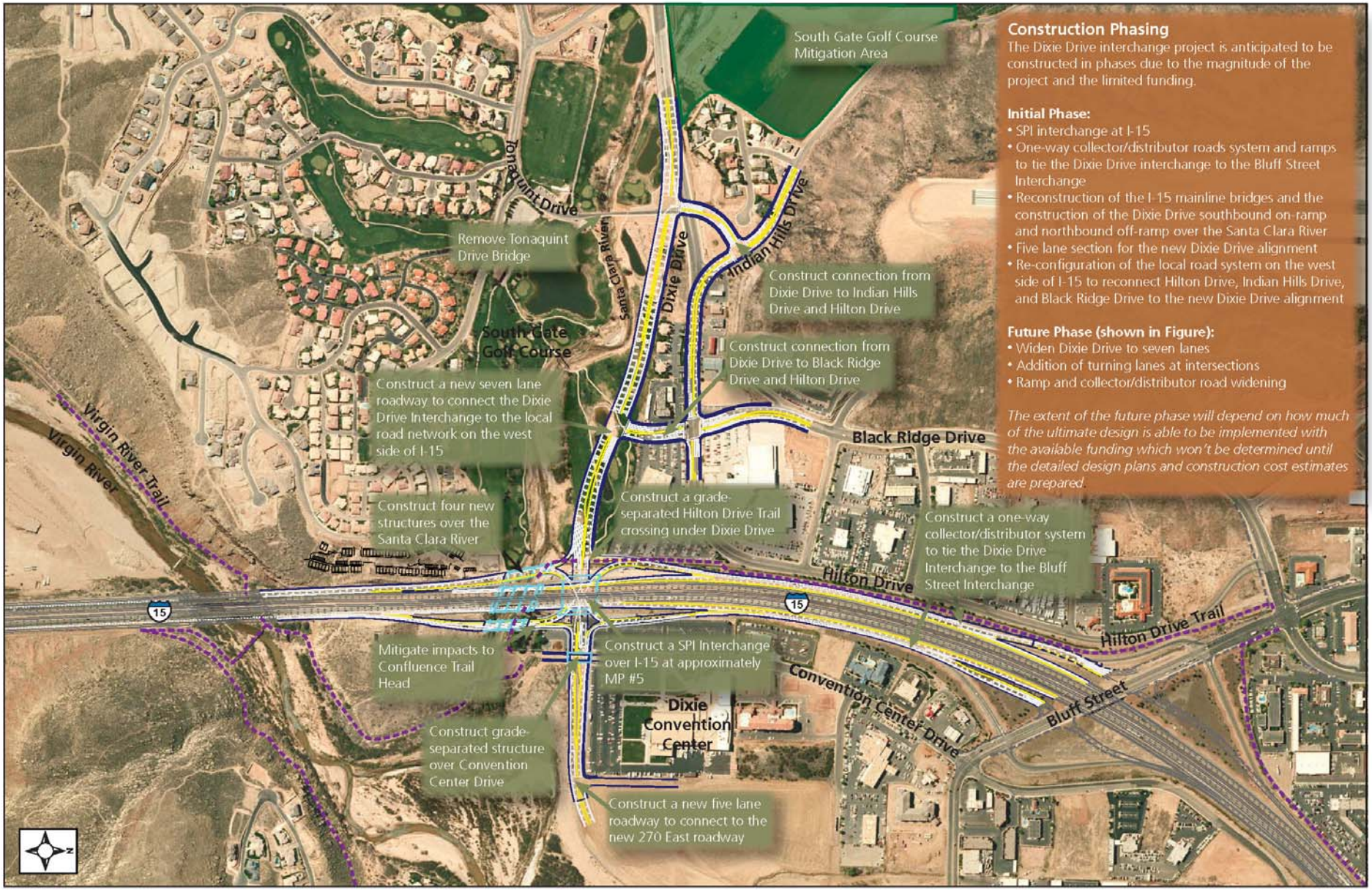
2.2 Proposed Construction Schedule

The lead agencies anticipate that the Dixie Drive Interchange project would be constructed in phases due to the magnitude of the project and the limited funding. The initial construction is expected to include the following elements:

- An interchange on I-15
- One-way collector-distributor road system and ramps to tie the Dixie Drive interchange to the Bluff Street interchange
- Reconstruction of the I-15 mainline bridges and the construction of the Dixie Drive southbound on ramp and northbound off ramp over the Santa Clara River
- A minimum five-lane section for the new Dixie Drive alignment
- The reconfiguration of the local road system on the west side to reconnect Hilton Drive, Indian Hills Drive, and Black Ridge Drive to the new Dixie Drive alignment

Future construction phases could include widening Dixie Drive as well as possibly adding turn lanes at intersections and widening some ramps and/or collector-distributor roads. These actions are considered in this evaluation. Also, future projects proposed by both UDOT and the City of St. George would affect the Dixie Drive interchange.

Figure 2. Proposed Actions Associated with the Dixie Drive Interchange Project



3.0 Project Action Area

The *action area* is defined as the area that could be affected directly or indirectly by a federal action (50 Code of Federal Regulations [CFR] 402.02). The action area for the Dixie Drive Interchange project takes into consideration the following activities and effects that would occur as a result of this project:

- Removal of two existing bridge piers and construction of four new overwater structures associated with proposed reconstruction of the I-15 bridge over the Santa Clara River, including two new on and off ramps to Dixie Drive from I-15 and vice versa (that is, the interchange)
- An increase in impervious surfaces and construction of stormwater treatment facilities for runoff, or connections to the city sewer system
- Construction of Dixie Drive and associated infrastructure for the entire roadway corridor, including related intersection upgrades, etc. (effects include noise, land clearing, and armoring along portions of the Santa Clara River)
- Removal of Tonaquint Bridge
- Construction associated with the Southgate Golf Course mitigation site

The aquatic portion of the action area is defined as the Santa Clara River and its associated floodplain from about 0.25 mile upstream of the existing Tonaquint Bridge to the confluence with the Virgin River. The area upstream of the Tonaquint Bridge is included because of hydrogeomorphic modifications resulting from removing the bridge. The reach of the Santa Clara River downstream to the confluence with the Virgin River is included because pollutants could be introduced into both rivers due to construction of impervious surfaces within the Santa Clara River floodplain. That reach is also included in the action area to account for hydraulic alterations due to construction of on and off ramps associated with Dixie Drive at the I-15 interchange and the associated sediment transported to the confluence of the Virgin River during high flows.

The terrestrial portion of the action area is defined by both direct impacts from the proposed construction of Dixie Drive and its associated infrastructure as well as construction associated with the golf course mitigation site and removal of Tonaquint Bridge. Due to the likely use of pile-driving equipment in floodplains and other heavy machinery associated with installing Dixie Drive and new bridge piers to support on and off ramps, the extent of project-related noise defines the terrestrial portion of the action area. Existing in-air noise levels in the vicinity of the proposed actions vary considerably, from noise levels exceeding 80 dB (decibels) at I-15 to relatively quiet conditions of 40 to 50 dB in the vicinity of the golf course mitigation area. For the purpose of this evaluation, construction-related noise is expected to decrease to baseline levels about 0.25 mile from the proposed actions in all directions (see Figure 3 below).

Figure 3. Action Area for the Proposed Dixie Drive Interchange Project

4.0 Environmental Baseline for Project Area

4.1 Physical Environment

The proposed project would take place in the city of St. George in Washington County, Utah. The elevation of the project area ranges from about 2,500 to 2,580 feet. The majority of proposed actions would occur within the lowest reach of the Santa Clara River, with potential indirect effects extending to its confluence with the Virgin River. The annual mean temperature is 59.9 °F (degrees Fahrenheit) with 39.7 °F as a monthly mean for January, the coldest month, and 84.1 °F as the monthly mean for July, the hottest month. The average annual precipitation is about 8.25 inches, with about a third of this occurring during the winter months. Average annual snowfall is only about 3.2 inches and occurs between November and March.

4.2 Vegetation Communities

There are four basic vegetation communities, three "natural" and one disturbed: river channel wetlands, scrub-shrub wetlands, upland riparian, and landscaped/ disturbed. The vegetation types typically found in riverine wetland areas along the Santa Clara and Virgin Rivers are cattails (*Typha angustifolia*), bulrushes (*Scirpus* spp.), rushes (*Juncus* spp.), salt-cedar (*Tamarix ramosissima*), willows (*Salix* spp.), cottonwoods (*Populus* spp.), rough cockle-bur (*Xanthium strumarium*), sand burgrass (*Cenchrus longispinus*), and blue panicgrass (*Panicum antidotale*). Bordering the riverine wetlands are scrub-shrub wetlands in some locations; these contain coyote willow (*Salix exigua*), arrowweed (*Pluchea sericea*), common reed (*Phragmites australis*), and sometimes salt-cedar.

The vegetation types typically found in the upland riparian areas include some of the same species such as cottonwoods, willows, salt-cedar, and blue panicgrass. However, uplands also contain big saltbush (*Atriplex lentiformis*), Russian thistle (*Salsola iberica*), sweet clover (*Melilotus* spp.), common sunflower (*Helianthus annuus*), upland grasses (*Festuca* spp. and *Poa* spp.), and the introduced Bermuda grass (*Cynodon dactylon*).

The vegetation types typically found in the landscaped areas include planted golf turf grass (the particular grass species depend on the section of the golf course) and planted cottonwoods and ornamentals. Along some of the disturbed edges of the golf course and areas soon to be or currently under construction, other invasive species are present including Russian thistle, kochia (*Kochia scoparia*), Bermuda grass, salt-cedar, and an assortment of other, smaller annual weeds such as tall tumbling mustard (*Sisymbrium altissimum*).

4.3 Aquatic Environment

4.3.1 Hydrology and Hydraulics

Water in the Santa Clara and Virgin Rivers comes from surface runoff from rainfall and snowmelt and from the groundwater entering the channels through springs during late summer and fall. Snowmelt makes up the largest portion of the annual stream flow, though high flow events often occur during heavy rain.

Virgin River

In the vicinity of the proposed project, the Virgin River has been classified as an unstable Rosgen C5 type system. The reach in the vicinity of the I-15 bridge is somewhat narrowly confined with upper bank slopes of less than 30% on both the left and right banks. The lower banks are mostly unvegetated, although there is some tamarisk and coyote willow. Sand and small gravels make up both the bed and bank material, and these contribute to a highly sediment-mobile system. The river supports a riparian community that primarily consists of tamarisk, coyote willow, and several grasses, rushes, and forbs.

When water is diverted from the Virgin River during low-flow periods, particularly at the Quail Creek and Washington Fields diversions upstream of the project area (see Figure 4 below), this diversion causes very low flows in the river. However, high flows in the river are relatively common due to local high-precipitation storms (Cross 1985) and input from numerous springs and irrigation return flow (Heckmann and others 1987). In the project area, there is flow in the Virgin River year-round. Average monthly streamflow data for the Virgin River near St. George are presented in Table 2.

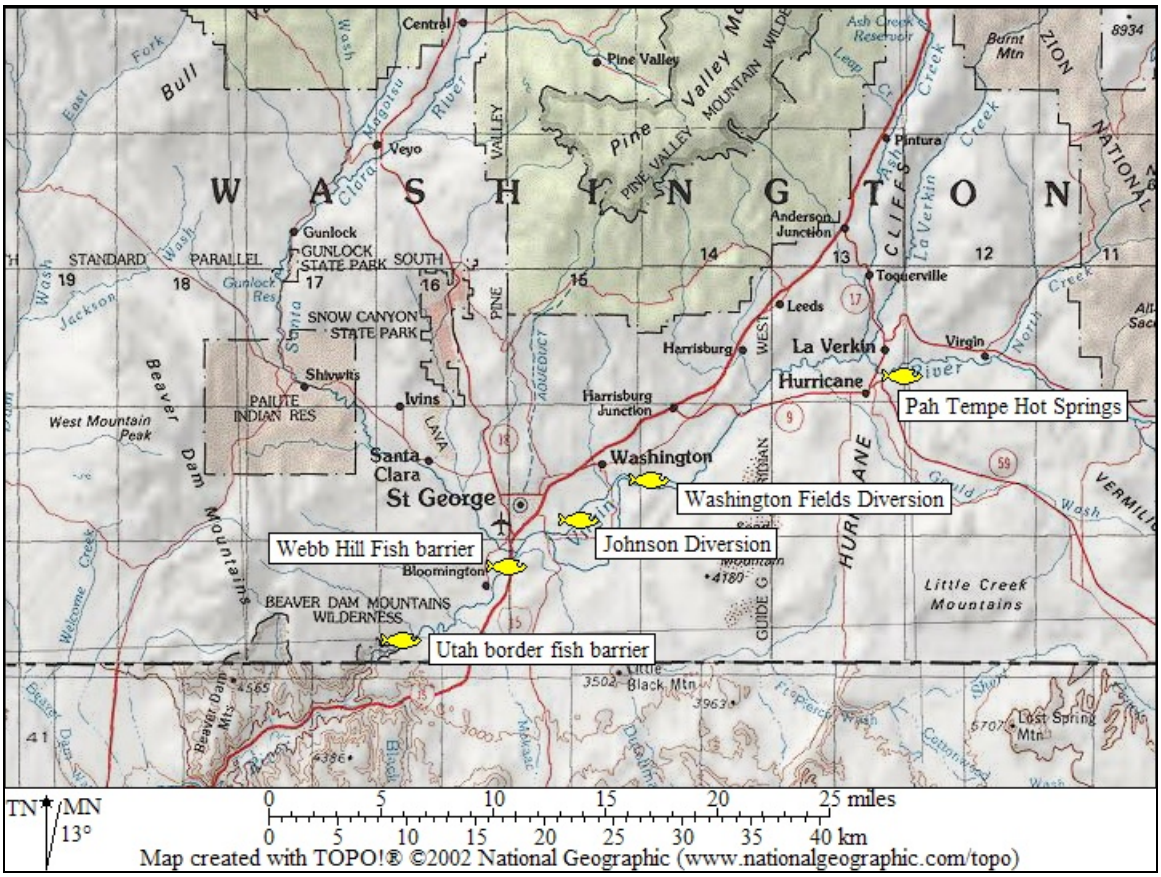
Table 2. Average Monthly Flows for the Virgin and Santa Clara Rivers near St. George, Utah

in cubic feet per second (cfs)

River	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Virgin River	258	242	302	362	394	116	68	111	90	110	139	153
Santa Clara River	23	25	37	25	19	15	5.9	7.1	4.3	4.4	6.9	8.3

Source: USGS 2007

Figure 4. Existing Diversion Structures and Collection Reaches on the Virgin River



The hydrologic profile of the Virgin River is similar to that of most southwestern desert riparian areas. Flows are highly variable, with daily and seasonal fluctuations in temperature, flow, and physical and chemical parameters (Deacon and others 1987). Water in the Virgin River has high salinity and turbidity. High flows during spring runoff are common in April and May, with extreme low flows during the dry summer months, typically July and August. Flash floods can result from monsoon rains later in the summer, and peak annual flows are more common in August and September than in any other months.

After flash floods, the Virgin River frequently forms new channels within the wider parts of the floodplain, which results in braiding and disconnected oxbows. Aquatic vegetation in the channels is limited by variable-flow conditions and unstable substrates. The absence of major dams on the main stem of the Virgin River allows relatively natural flooding to occur within the floodplain during peak flows. Quail Creek Dam and Sand Hollow Dam are off the main stem; however, water is diverted to them from the main stem, and these diversions affect both flood and base flows. The majority of the Virgin River streambed has not been channelized, which allows the river to frequently change course within

the floodplain and form braided channels, oxbows, and backwaters that help promote the formation of riparian and wetland vegetation.

Santa Clara River

Within the action area, the Santa Clara River has a relatively low gradient and varies in width from about 8 to 50 feet with a normal active channel width of about 12 feet and a substrate of coarse alluvial sand and/or gravel with a high degree of silt and embeddedness. There is surface flow in the action area year-round during all years on record (USGS 2007); however, flows during drought years, most recently 2002 and 2003, were near zero. During drought years, extreme low to nonexistent flows effectively eliminate habitat for fish species near St. George. During summer monsoons, flash floods are common. Average monthly stream flow data for the Santa Clara River at St. George are presented above in Table 2, Average Monthly Flows for the Virgin and Santa Clara Rivers near St. George, Utah.

Several mitigation and revegetation projects have been completed by the Natural Resources Conservation Service (NRCS) near the proposed action, and mitigation associated with the St. George sewer line crossing (sewer main to cross the Virgin and Santa Clara Rivers) is proposed in the area. An established native vegetation area is located immediately downstream of the diversion dam near the mouth of the Santa Clara River.

4.3.2 Water Quality

A Total Maximum Daily Load (TMDL) water quality study was completed for the Virgin River watershed and approved by the U.S. Environmental Protection Agency (EPA) on September 20, 2004 (Utah Division of Water Quality 2004). The TMDL study was conducted to address various segments of the Santa Clara and Virgin Rivers that are listed on Utah's 2002 Section 303(d) list of impaired waters. Table 3 below shows the beneficial-use classification for each river, the segments that are near the project or immediately downriver that have impaired beneficial uses, the constituent that causes the impairment, and the source of impairment.

The TMDL study stated that many of the impairments occur during low-flow summer conditions when pollutants tend to be more concentrated, resulting in decreased transport and resident times. The study also noted that the temperature TMDL might not be warranted for the Santa Clara River. Monitoring since 1982 showed that the average temperatures are between 15 °C (degrees Celsius) and 18 °C and that only a few readings exceeded the standard of 27 °C.

Table 3. Impaired Beneficial Uses for the Virgin and Santa Clara Rivers

Name	Beneficial Uses	Impaired Beneficial Use(s)	Cause of Impairment	Source of Impairment
Santa Clara River (confluence with Virgin River to Gunlock Reservoir)	1C, 2B, 3C, 4	3C, 4	Total dissolved solids, temperature, selenium	• Total dissolved solids – Streambank/land erosion, stormwater/dry-weather flows (irrigation), irrigation return flows • Temperature – Natural conditions, low flows • Selenium – Streambank/hillside slope erosion, irrigation return flows, stormwater/dry-weather flows (irrigation) from communities
Virgin River (state line to confluence with Santa Clara River)	2B, 3B, 4	4	Total dissolved solids	• Total dissolved solids – Streambank/land erosion, Fort Pearce Wash, St. George wastewater treatment plant, Santa Clara River, urban stormwater/dry-weather flows (irrigation), irrigation return flows, geothermal (hot springs), geology
Virgin River and tributaries (Santa Clara River confluence to Quail Creek diversion; excludes Quail Creek and Leads Creek)	2B, 3B, 4	4	Total dissolved solids	• Total dissolved solids – Pah Tempe Hot Springs, land erosion

Source: Utah Division of Water Quality 2004

4.3.3 Native Fish Species

Six native fish are present in the Virgin River (see Table 4 below) including the federally endangered woundfin (*Plagopterus argentissimus*) and Virgin River chub (*Gila seminuda*). Three other species, Virgin spinedace (*Lepidomeda mollispinis mollispinis*), desert sucker (*Catostomus discobolus*), and flannelmouth sucker (*Castostomus latipinnis*), are Utah state species of special concern. The speckled dace (*Rhinichthys osculus*) is also present in the system. Currently, all six native fish use the reaches of the Virgin River near the confluence with the Santa Clara River (which is within the action area). Within the past 5 years, both woundfin and Virgin River chub have been collected from the Virgin River near the I-15 bridge crossing (Golden 2008b).

The Virgin River Program's ongoing red shiner (*Notropis lutrensis*) eradication efforts have eliminated most fish in the Virgin and Santa Clara Rivers below a 10-foot dam near the confluence of the rivers (Golden 2007). This dam was constructed to help remove non-native species from the Virgin River. It effectively excludes non-native species but has also excluded the flannelmouth sucker, woundfin, and Virgin River chub from the Santa Clara River.

Table 4. Native Fish Species in the Action Area

Common Name	Scientific Name	Sensitive Status[a]		Probability of Occurrence
		Federal	State	
Woundfin	*Plagopterus argentissimus*	E	E	Present in Virgin River
Virgin River chub	*Gila seminuda*	E	E	Present in Virgin and Santa Clara[b] Rivers
Virgin spinedace	*Lepidomeda mollispinis mollispinis*	—	CA	Present in Virgin and Santa Clara Rivers
Desert sucker	*Catostomus clarki*	—	SOC	Present in Virgin and Santa Clara Rivers
Flannelmouth sucker	*Catostomus latipinnis*	—	CA	Present in Virgin River
Speckled dace	*Rhinichthys osculus*	—	—	Present in Virgin and Santa Clara Rivers

[a] Status definitions:

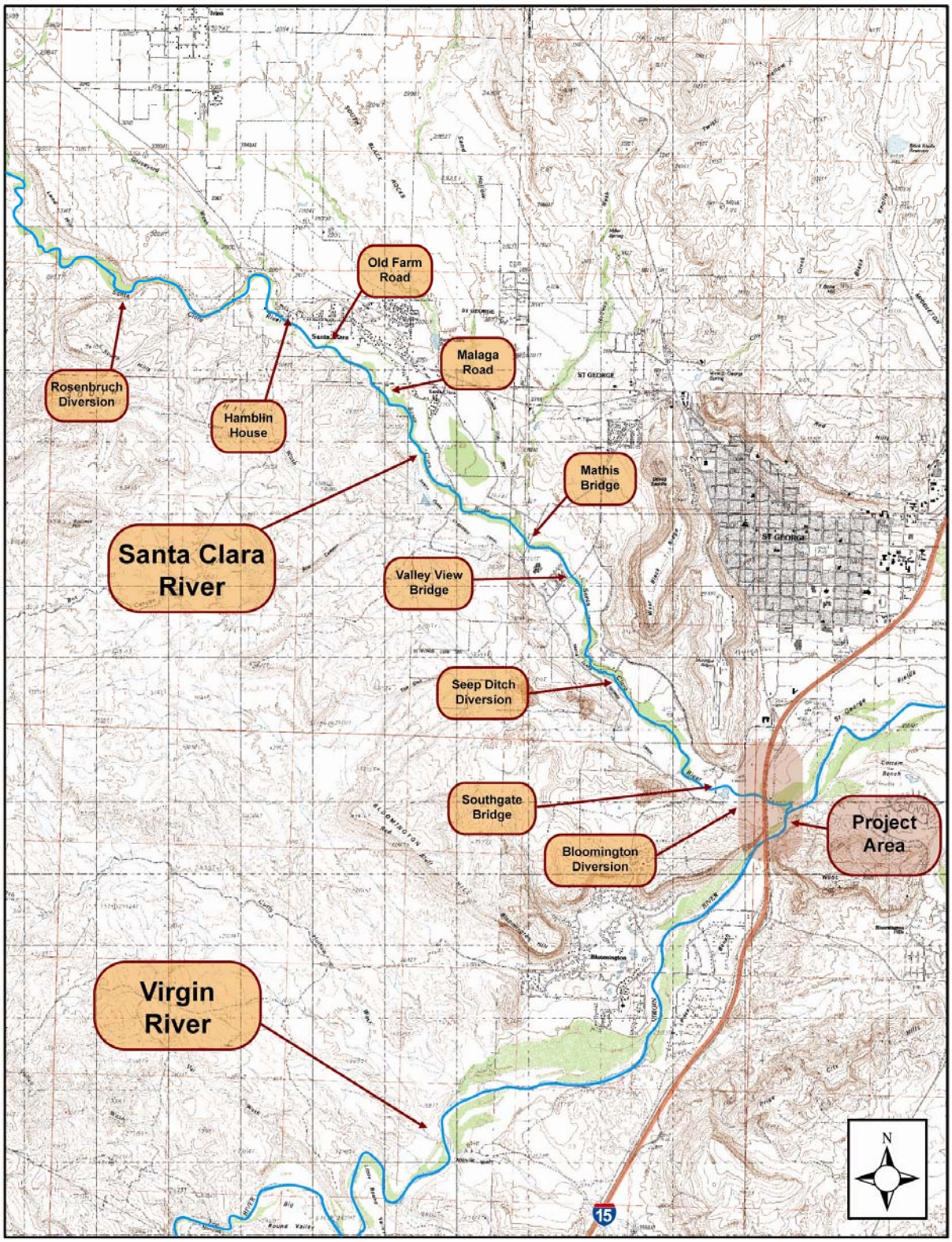
E = endangered
SOC = species of concern
CA = Conservation Agreement is in place for this species

[b] The reported occurrence in the Santa Clara River was a single transient that was collected immediately upstream of the Bloomington Diversion in the early 2000s (Golden 2008c). No Virgin River chub have been collected during recent surveys conducted in the Santa Clara River.

In October 2007, UDWR completed a rotenone treatment on the Virgin River between Johnson Diversion and the Arizona border (see Figure 4 above, Existing Diversion Structures and Collection Reaches on the Virgin River). The same area was treated the previous 2 years, but all six native species have been documented in the Virgin River close to the confluence with the Santa Clara River from 2005 to 2007. The section of the river near the confluence with the Santa Clara was reported to contain some of the best habitat for the woundfin prior to the invasion of red shiner in the mid-1980s (Golden 2007). The purpose of ongoing eradication efforts is to restore habitat for woundfin and other native fish.

The Santa Clara River upstream of the exclusion dam is dominated by desert sucker and speckled dace. Part of the Virgin spinedace Conservation Agreement and Strategy is to restore Virgin spinedace to the Santa Clara River from Gunlock Reservoir downstream to the Virgin River confluence. In March 2007, UDWR relocated some Virgin spinedace to the lower Santa Clara River near the Mathis Road Bridge (see Figure 5 below). As of November 2007, these fish and some of their progeny were still being collected, primarily between Malaga Road and the Valley View Road Bridge. Based on these findings, these spinedace have successfully reproduced and have survived through the critical summer low-flow periods (Golden 2007).

Figure 5. Existing Diversion Structures and Collection Reaches on the Santa Clara River



The Santa Clara River is considered devoid of woundfin and flannelmouth sucker (Golden 2008c). Neither species has been collected during the September-to-December 2007 sampling surveys of the Santa Clara River (Boman and Buckel 2007; Stamieszkin 2007a, 2007b). UDWR reports that a Virgin River chub was collected in the early 2000s immediately upstream of the Bloomington Diversion (Golden 2008b), though this species has not been captured in recent surveys conducted in the vicinity of the proposed action (Boman and Buckel 2007; Stamieszkin 2007a, 2007b; Golden 2008c).

5.0 Status of Listed Species and Associated Critical Habitat

5.1 Virgin River Chub

5.1.1 Status, Habitat, and Distribution

The Virgin River chub is a rare minnow that is present only in the Virgin River system of southwestern Utah, southern Nevada, and northwestern Arizona. In Utah, the species is restricted to limited areas of the main-stem Virgin River. The Virgin River chub was listed as endangered under the Endangered Species Act in 1989 (54 Federal Register 35305) due to drastic reductions in numbers compared to historic conditions.

The Virgin River chub was first collected in the 1870s from the Virgin River near Washington, Utah. Historically, it was collected in the main-stem Virgin River from Pah Tempe Springs, Utah, downstream to the confluence with the Colorado River in Nevada (Cross 1975). Presently, Virgin River chub are present in the main-stem Virgin River from Pah Tempe Springs, Utah, downstream to at least the Arizona-Nevada border. Anecdotal information suggests that Virgin River chub were very abundant before the 1900s and that the abundance and range of Virgin River chub have declined substantially throughout its range in Utah, Arizona, and Nevada since European-American settlement and associated water development. This decline is primarily attributed to habitat loss through dewatering of the river system such that some areas are inundated by reservoirs and other areas are completely dewatered. Non-native species that prey on young Virgin River chub have also contributed to this population decline.

Virgin River chub are most often associated with deep run or pool habitats of slow to moderate velocities with large boulders or in-stream cover, such as root snags. Both adults and juveniles use these habitats; however, the larger adults are collected most often in the deeper pools in the river. Hardy and others (1989) determined that Virgin River chub are most often collected in depths ranging from 0.6 to 3.0 feet in velocities ranging from 0.0 to 2.5 feet per second over sand substrates with boulders or in-stream cover. Schumann (1978) and Deacon and others (1987) determined that the adult temperature preference is about 75 °F.

Although little is known about the population dynamics of this species, spawning is known to occur in the spring, and ripe females have been reported during April, May, and June (Hickman 1986, 1987). Hickman (1987) also noted that good spawning years for the chub coincided with good spawning years for woundfin. It is likely that Virgin River chub live for many years, perhaps for decades, but they mature rapidly and probably spawn in their second or third year (Williams and Deacon 1998).

5.1.2 Critical Habitat

Critical habitat was designated for the Virgin River chub on January 25, 2000 (65 Federal Register 4140 and 4156) and includes the main-stem Virgin River and its 100-year floodplain from the confluence of La Verkin Creek to Halfway Wash. The Santa Clara River is not included in the designated critical habitat; however, the shared floodplain with the Virgin River at the confluence of the two rivers is included.

According to USFWS, the primary constituent elements (PCEs) of critical habitat determined necessary for the survival and recovery of Virgin River chub include those related to water, physical habitat, and the biological environment (65 Federal Register 4144). The desired condition for each of these elements is described below.

1. **Water** – A sufficient quantity and quality of water (that is, temperature, dissolved oxygen, contaminants, nutrients, turbidity, etc.) that is delivered to a specific location in accordance with a hydrologic regime that is identified for the particular life stage for each species. This includes the following:
    - Water quality characterized by natural seasonally variable temperature, turbidity, and conductivity
    - Hydrologic regime characterized by the duration, magnitude, and frequency of flow events capable of forming and maintaining channel and in-stream habitat necessary for particular life stages at certain times of the year
    - Flood events inundating the floodplain necessary to provide the organic matter that provides or supports the nutrient and food sources for the listed fishes
2. **Physical Habitat** – Areas of the Virgin River that are inhabited or potentially habitable by a particular life stage for Virgin River chub, for use in spawning, nursing, feeding, and rearing, or corridors between such areas:
    - River channels, side channels, secondary channels, backwaters, and springs, and other areas which provide access to these habitats
    - Areas with slow to moderate velocities, within deep runs or pools, with predominately sand substrates, particularly habitats that contain boulders or other instream cover
3. **Biological Environment** – Food supply, predation, and competition are important elements of the biological environment and are considered components of this constituent element. Food supply is a function of

nutrient supply, productivity, and availability to each life stage of the species. Predation and competition, although considered normal components of this environment, are out of balance due to non-native fish species in many areas. Components of this constituent element include the following:

- Seasonally flooded areas that contribute to the biological productivity of the river system by producing allochotonous (humus, silt, organic detritus, colloidal matter, and plants and animals produced outside the river and brought into the river) organic matter which provides and supports much of the food base of the listed fishes
- Few or no predatory or competitive non-native species in occupied Virgin River fishes' habitats or potential re-establishment sites

5.1.3 Occurrence in the Action Area

Occurrence in the Virgin River

Due to the high number of non-native fishes in the reach of the Virgin River near the confluence of the Santa Clara River, the presence of native species, including the Virgin River chub, has been inconsistent (Golden 2007). However, the Virgin River Program has been stocking Virgin River chub into reaches of the Virgin River in the vicinity of the confluence of the Virgin and Santa Clara Rivers (Meismer 2007). Due to stocking, it is assumed that Virgin River chub could be present in the reach that receives flow from the Santa Clara River, although abundance is likely low and distribution is likely fragmented due to ongoing red shiner eradication efforts in the Virgin River (Meismer 2007, 2008; Golden 2008a). Within the past 5 years, Virgin River chub have been collected in the vicinity of the I-15 bridge crossings of the Virgin River (Golden 2008b).

Current sampling methods for chub are inadequate for estimating population numbers in the Virgin River because chub are uncommon and are generally present in deep pools associated with runs. However, in June 2007, a full-pass seining conducted by UDWR from the Johnson Diversion to the Webb Hill Barrier yielded 47 Virgin River chub (Grover 2007). The Webb Hill barrier is immediately downstream of the I-15 bridge (see Figure 4 above, Existing Diversion Structures and Collection Reaches on the Virgin River), and therefore this sampled reach includes that portion of the Virgin River included in the action area (Virgin River at the confluence with the Santa Clara River).

In the Virgin River, Virgin River chub spawn in late spring and early summer over gravel or rock, although spawning times can vary based on annual runoff. However, spawning Virgin River chub have not been documented near the

confluence with the Santa Clara River, most likely due to the prevalence of non-native fish since the 1980s (Meismer 2007).

Occurrence in the Santa Clara River

A transient Virgin River chub was reportedly captured in the Santa Clara River by UDWR biologists just above the Bloomington Diversion (see Figure 5 above, Existing Diversion Structures and Collection Reaches on the Santa Clara River) in the early 2000s (Golden 2008c). However, this species has not been captured in recent surveys conducted in the reaches of the Santa Clara River portion of the action area (Boman and Buckel 2007; Stamieszkin 2007a, 2007b; Golden 2008c). The presence of this species in the Santa Clara River portion of the action area is extremely unlikely, and there are no viable populations upstream of the non-native species exclusion barrier near the mouth.

5.2 Woundfin

5.2.1 Status, Habitat, and Distribution

The woundfin is a species of minnow endemic to the Virgin River. It was listed as federally endangered in 1970 (35 Federal Register 16047) in response to drastic population reductions, mainly due to the introduction of non-native species and the loss of habitat due to flow modifications.

Woundfin historically were found from Pah Tempe Springs on the mainstem of the Virgin River and the lower portion of La Verkin Creek in Utah, downstream to Lake Mead in Nevada. Woundfin have experienced continuing significant population declines in both occupied range and abundance. An examination of long-term sampling data from stations in Utah, Arizona, and Nevada documented declines between 1976 and 1993 (Holden and Zucker 1996). Sampling efforts since 1994 continue to show this decline (Virgin River Fishes Recovery Team, no date). These declines have been linked to the spread of red shiners into and up the Virgin River from the Lake Mead area in the 1970s through today (USFWS 1994; Holden and others 2001). In the vicinity of the Twin Bridges near St. George immediately upstream of the action area, dramatic declines in the number of woundfin collected were recorded from 1983 to 1984, likely due to the presence of red shiner in the area (Deacon 1988).

In Utah, significant efforts to restore the woundfin population are ongoing. The Virgin River Resource Management and Recovery Program provides funding for research and management activities to recover the woundfin in Utah. These activities include provision for minimum flows, creation of fish barriers, and rotenone poisoning projects to eliminate non-native fish species, especially the red shiner, from woundfin habitats.

5.2.2 Critical Habitat

Critical habitat for the woundfin was designated in 2000 (65 Federal Register 4140) and includes the Virgin River and its 100-year floodplain from the Virgin River confluence with La Verkin Creek in Utah to Halfway Wash in Nevada (USFWS 2000). The Santa Clara River is not included in critical habitat except for the shared floodplain with the Virgin River at the confluence. Primary constituent elements for designated woundfin critical habitat are similar to the Virgin River chub with respect to both water and the biological environment. With respect to the physical environment, the following areas of the Virgin River are inhabited or potentially habitable by a particular life stage for woundfin:

- Areas inhabited by adult woundfin include river channels, side channels, secondary channels, backwaters, springs, and other locations that provide access to these habitats.
- Areas inhabited by adult and juvenile woundfin include runs and pools adjacent to riffles that have sand and sand/gravel substrates.
- Areas inhabited by juvenile woundfin are generally deeper and slower. When turbidity is low, adults also tend to occupy deeper and slower habitats.
- Areas inhabited by woundfin larvae include shoreline margins and backwater habitats associated with growths of filamentous algae.

5.2.3 Occurrence in the Action Area

Occurrence in the Virgin River

Woundfin numbers in the reach of the Virgin River near the confluence with the Santa Clara River fluctuate greatly depending on stocking rates, environmental conditions, and efforts to eradicate non-native species. Due to the high number of non-native fish in the Virgin River prior to recent rotenone treatments, the presence of native species, including the woundfin, has been inconsistent. However, the Virgin River Program has been stocking woundfin into reaches of the Virgin River. Within the past 5 years, woundfin have been collected in the Virgin River near the confluence of the Santa Clara River (Golden 2008b); however, spawning has not been documented (Meismer 2007).

In 2007, UDWR biologists seined reaches of the Virgin River from the Webb Hill Barrier to the Sun River Golf Course, a reach that includes the I-15 bridge crossing. Deep run and pool habitats with vegetation were sampled by seining, which captured three woundfin in February and four in April (Kreitzer 2007a, 2007b). In June 2007, a full pass from the Johnson Diversion to the Webb Hill Barrier yielded one adult woundfin (Grover 2007). These surveys indicate that

woundfin are still present in the Virgin River near the proposed project, though widely scattered and in low numbers, especially compared to the invasive red shiner.

Occurrence in the Santa Clara River

Woundfin have not been captured in the Santa Clara River upstream of the non-native species exclusion dam (Golden 2008b; Meismer 2007). Recent UDWR-conducted collection efforts in the Santa Clara River confirm this, and no woundfin were collected during surveys in 2007 or early 2008 (Stamieszkin 2007a, 2007b; Boman and Buckel 2007).

5.3 Southwestern Willow Flycatcher

5.3.1 Status, Habitat, and Distribution

The southwestern willow flycatcher was listed as federally endangered in 1995 (60 Federal Register 10694). The species breeds in the southwestern U.S., including southern Utah, but winters in Mexico and Central America. This subspecies of the willow flycatcher is a rare summer breeder in southern Utah. It typically inhabits a fairly broad range, in both elevation and plant community, of healthy riparian habitat. It prefers a mosaic of dense stands of either willow and/or salt-cedar communities interspersed with openings and shorter vegetation. However, for nesting habitat, this species prefers these riparian areas to be inundated for large portions of the year, with surface water very close to or surrounded by vegetation. These areas of vegetation must also be at least 30 feet wide if in a linear configuration, or over 2 acres in size otherwise (Sogge and others 1997).

5.3.2 Critical Habitat

Critical habitat was officially designated in 2005 (70 Federal Register 60886) and includes portions of southern California; Arizona; New Mexico; Clark County, Nevada; and Washington County, Utah. Within the action area, critical habitat includes the Virgin River and the confluence area with the Santa Clara River.

5.3.3 Occurrence in the Action Area

Most of the small patches of riparian vegetation within the action area along the Santa Clara River next to the golf course are not adequate nesting habitat and provide very marginal habitat for migratory stopovers. The closest nesting habitat is about 1.2 miles to the northeast along the Virgin River within the Riverside Marsh. Additional nesting is also known to occur about another 2 miles northeast of the Riverside Marsh (3.5 miles total from the action area) in the Seegmiller Marsh. The riparian habitat surrounding the confluence area (of the Santa Clara and Virgin Rivers) is known only to be a temporary migratory stopover for the species in recent years (HDR 2007a, 2007b).

Surveys for habitat in the action area were conducted during field visits on December 18 to 20, 2007, and on January 22 to 23, 2008. However, no surveys for nesting individuals were conducted, since this part of Washington County is the subject of extensive survey and record-keeping by UDWR and USFWS.

Although critical habitat is officially designated within the action area at the confluence of the Virgin and Santa Clara Rivers, agency personnel have stated that the action area does not support the necessary PCEs for critical habitat (HDR 2007a, 2007b). Additionally, critical habitat has not been designated in the direct footprint of proposed construction along riparian areas of the Santa Clara River.

5.4 Yellow-Billed Cuckoo

5.4.1 Status, Habitat, and Distribution

The yellow-billed cuckoo (*Coccyzus americanus*) was included in a petition for listing filed in 1998 and then in a notice of a 12-month petition finding in 2001 (66 Federal Register 38611); the species remains a candidate for listing under the Endangered Species Act. Frequently described as a western U.S. subspecies, western yellow-billed cuckoos (*C. a. occidentalis*) breed in the western U.S., including southern Utah, but winter in South America. Distribution of this species in the U.S. is from central California to southern Idaho and south to Arizona and Texas. The greatest threat to this species appears to be loss of nesting habitat from removal of riparian vegetation and replacement of riparian vegetation by introduced and invasive species such as salt-cedar.

Yellow-billed cuckoos were historically common-to-uncommon summer visitors in Utah and across the Great Basin. The current distribution of yellow-billed cuckoos in Utah is poorly understood, although they appear to be an extremely rare breeder in lowland riparian habitats statewide. These birds arrive in late May or early June and breed during late June through July. Cuckoos typically start their southerly migration by late August or early September. Yellow-billed cuckoos are considered a riparian obligate species and are usually found in large

tracts (100 to 200 acres or more) of cottonwood/willow habitat with a well-developed overstory of cottonwoods and a dense subcanopy of willows and shrubs.

5.4.2 Occurrence in the Action Area

Records indicate that yellow-billed cuckoos were present in riparian areas in the action area (at the confluence of the Santa Clara and Virgin Rivers) as recently as the summer of 2000 (HDR 2007b). Two other recent sightings (nesting not confirmed) were recorded in the Riverside Marsh (about 1.2 miles northeast of the action area) and near the city of Santa Clara (about 5 miles northwest of the action area). However, the existing riparian habitat in the action area, especially after the recent flooding and salt-cedar removal operations by the City of St. George in the confluence area, does not provide suitable nesting habitat for this species. The confluence area could provide some marginal migratory stopover (temporary-use) habitat for this species, though most of this habitat is outside and beyond the project's construction footprint.

Surveys for habitat in the action area were conducted during field visits on December 18 to 20, 2007, and on January 22 to 23, 2008, but no surveys for nesting individuals were conducted. UDWR and USFWS maintain extensive records for yellow-billed cuckoo in this part of Washington County, and those records include recent surveys in the vicinity of the proposed action.

6.0 Effects of the Proposed Project on Species and Critical Habitat

6.1 Virgin River Chub

6.1.1 Direct Effects

A transient Virgin River chub was reportedly captured in the Santa Clara River by UDWR biologists just above the Bloomington Diversion (see Figure 5 above, Existing Diversion Structures and Collection Reaches on the Santa Clara River) in the early 2000s (Golden 2008c). Although recent surveys have not captured any Virgin River chub in the Santa Clara River, the reported transient indicates a remote chance that individuals could find their way into the drainage. This could occur during extremely high-flow events in which water overtops the predator exclusion dam near the confluence with the Virgin River. Due to this possibility, however remote, any actions proposed within, adjacent to, or over the river could affect individuals if they are present in the Santa Clara River.

Because Virgin River chub are known to be present in the Virgin River near the confluence with the Santa Clara River, direct construction effects are possible, though unlikely, considering the nature of proposed actions and the distance of the Virgin River (0.3 mile) from proposed construction areas along the Santa Clara River. Turbidity and sedimentation could temporarily increase downstream of in-water work that is associated with removing and installing overwater structures and associated bridge piers. Direct effects to listed fish as a result of an accidental spill or introduction of hazardous materials into aquatic habitats could include injury or mortality if a large volume of fuel or hazardous material is spilled into a water body. However, these effects would likely be insignificant given the distance of proposed activities from the Virgin River and the proposed implementation of best management practices (BMPs) and impact-minimization measures (see Section 7.0, Impact Avoidance and Minimization Measures). Insignificant effects are generally very small in scale, do not reach the level of *take* as defined by the Endangered Species Act, and cannot be meaningfully measured, detected, or evaluated.

The direct effects from constructing elements of the proposed Dixie Drive Interchange project are presented by topic below.

Construction of Bridges over the Santa Clara River

Constructing the Dixie Drive southbound on ramp and northbound off ramp over the Santa Clara River, along with reconstructing the I-15 mainline bridges, would disturb the soil and could affect water quality downstream to the Virgin River. Fugitive dust and runoff carrying silt loads from rainstorms could increase the

turbidity of the water in this area and downstream. Construction combined with the use of heavy equipment would disturb the river bed and the surrounding soil adjacent to the river, which would add sediment to the water when runoff occurs. However, Virgin River chub are relatively tolerant of increases in suspended sediments.

In-water work would be required to remove the existing I-15 piers and associated infrastructure. In-water work would also be required to pour the new concrete pier foundations, at least one of which would likely be located within the active flow of the river, even during summer periods of low flow. At this time, the lead agencies anticipate that other foundations would be located below the OHWM but not within the active flow of the river; therefore, construction would occur "in the dry." However, because designs are still preliminary, more than one foundation might be located within the active flow of the channel.

To reduce the possibility of adverse effects to the aquatic environment in the vicinity of the proposed in-water construction, the area would be dewatered behind cofferdams. The type of cofferdams (jersey barriers, sand bags, sheet piling, etc.) would be determined by the contractor based on the average flows during the construction period. The agencies anticipate that cofferdams will be feasible, but if not, the river could be routed into a flume to bypass the construction area. In either case, it is likely that sediments would be disturbed and that any fish in the vicinity of in-water work would be harassed.

Because Virgin River chub are not likely present in the Santa Clara River, it is extremely unlikely that dewatering activities would have any effect on the species. However, if they are present, the following in-water work would be used to remove fish, including other non-federally listed sensitive fish species, from the construction area. Although individuals would likely move away from the construction area when cofferdams are installed, if fish are observed behind a dam, removal and salvage operations would be used to safely relocate the fish downstream of the construction area.

Cofferdams would be installed over several hours to allow streamflow to be reduced gradually. Immediately before construction begins, qualified fish biologists, as determined through consultation with UDWR, would remove all fish from the immediate area where the cofferdams/flume would be installed. This removal would avoid the lethal take of fish that could be trapped under fill material as cofferdams are placed. The presence of humans in the stream channel would likely cause most fish to voluntarily move to safe areas upstream or downstream of the work area. Adult fish would be flushed from the area behind the cofferdams. Juveniles that do not displace voluntarily would be captured by seining and, if absolutely necessary, by use of a conventional backpack electro-fisher (or other methods as determined by UDWR).

Once captured, fish would be placed into a 5-gallon bucket using small dip-nets. Captured fish would be released back into the stream channel a safe distance (about 150 feet) downstream of the work area. Additionally, biologists would prepare a report for USFWS and UDWR that summarizes the number of fish handled, species, and individual lengths. After construction, cofferdams would be removed incrementally to minimize pulses of sediment downstream.

Adverse hydroacoustic effects associated with in-river work at the bridge (vibratory pile-driving of steel casing materials and/or piles for piers, and potential proofing with impact drivers) would be minimized since work would be conducted “in the dry.” The vibratory hammer method is a common technique used in pile installation where geologic conditions allow this method to be used. Installation of piling involves placing a choker around the pile and setting it in place at the riverbed. The pile is held steady while the vibratory hammer installs the pile to the required depth. Fish in the immediate vicinity of the action could be displaced or disturbed, but barotraumas to fish are not likely to occur during in-river work, especially since work would occur “in the dry.” Further, vibratory drivers produce sound-pressure levels that do not typically result in injury to fish (WSDOT 2008).

Because listed fish are not likely present in the Santa Clara River, they are not likely to be affected by underwater sound pressure levels. Fish in the Virgin River are extremely unlikely to experience downstream hydroacoustic impacts since the sharp bend in the river just upstream of the confluence should block the transfer of noise downstream to the Virgin River where listed fish species are present. Additionally, as reported by WSDOT (2008), impacts on fishes or other aquatic organisms have not been observed in association with vibratory hammers; for this reason, it is the preferred method for piling installation.

Although Virgin River chub are unlikely to be present in the Santa Clara River, aquatic and riparian habitat would be temporarily disturbed in the construction areas associated with equipment access and bridge construction. Placing steel casings would alter flows while forms are built and piers are poured, and bridge foundations are a permanent change that would alter the channel bottom and flow pattern of the Santa Clara River. When concrete is poured into pier forms, it could possibly contaminate the river water. Raw concrete is highly toxic to fish and other aquatic organisms, and the contractor would ensure that all concrete forms are sufficiently cured before the forms come into contact with active flows.

Removal of Tonaquint Bridge

Removing this bridge and associated abutments would involve using construction equipment adjacent to the river channel and within the floodplain. Sedimentation and turbidity are expected to increase temporarily in the immediate vicinity of bridge demolition; however, BMPs, including the use of hay bales and/or silt fencing or similar methods, would be used to reduce the amount of sediment that enters the Santa Clara River. Further, any in-water work associated with removing bridge abutments would take place during periods of extreme low flow to minimize in-stream effects. Because Virgin River chub have not been recently captured in the Santa Clara River, impacts to the species due to removing the bridge are unlikely. Impacts associated with a temporary increase in sedimentation associated with removing the bridge would not extend to the confluence of the Virgin River; therefore, impacts to Virgin chub that could be present in the action area are not anticipated.

Armoring along Portions of Dixie Drive in the Floodplain

Portions of Dixie Drive would be constructed below the OHWM of the Santa Clara River just downstream of Tonaquint Drive (see Figure 2 above, Proposed Actions Associated with the Dixie Drive Interchange Project). This would remove existing grasses and replace currently eroded banks with armoring along a linear stretch between 700 and 2,500 feet (pending hydraulic analysis and further design). Riparian vegetation in this location is lacking, so removing grasses is unlikely to alter the local nutrient cycles or remove sources of allochotonous input. Further, existing vegetation does not likely contribute to reduced stream temperatures; therefore, removing this vegetation is unlikely to affect surface water temperatures.

Armoring along the edge of the southern shoulder of the new roadway would be required to protect the road from the erosive forces of the river, particularly during extreme high-flow events. UDOT proposes to stabilize the riverbank adjacent to the roadway in one of two ways.

Smooth-Surface Structural Elements. One option is using smooth-surface structural elements such as concrete walls or metal sheet piling. Piling, if used, would be driven “in the dry,” and therefore hydroacoustic impacts associated with pile driving should not produce underwater sound-pressure waves that affect fish species. Regardless, Virgin River chub are not likely present in the Santa Clara River, and any hydroacoustic impacts due to driving piles below the OHWM would be minor downstream of the Virgin River due to numerous bends in the Santa Clara River in the vicinity of construction.

Riprap. The second option proposed for armoring is using riprap. Riprap would be placed along the eroded streambank for a linear distance of between 700 and 2,500 feet (pending hydraulic analysis and further design) and in-planted with native vegetation, possibly including willows. Although this option is under consideration, both USFWS and UDWR have stated that riprap could provide shelter for invasive fish species during piscicide treatments. If non-native predatory species use riprap to evade such treatments, native species in the Santa Clara River could experience adverse effects from predation and competition for food and resources. However, because there is only one incidental report of Virgin River chub in the Santa Clara River in recent collections (in 2000), effects to chub are likely to be insignificant and discountable and should not result in measurable effects that would reach the level of take.

Further, if non-native species in the Santa Clara River use riprap to evade piscicide treatments, they would not have habitat available in the Virgin River, where chub are documented. For this reason, effects to Virgin River chub due to invasive species in the Santa Clara River are unlikely. There is extensive riprap upstream of the proposed bank stabilization, so adding more riprap as part of the proposed project is unlikely to have a measurable effect.

The proposed bank stabilization would be placed at existing grades and constructed so that the size and flood-carrying capacity of the existing Santa Clara River channel are maintained. The installation of such armoring could introduce sediments and temporarily increase turbidity in the immediate construction area since it would be conducted in the floodplain and close to the channel. However, use of BMPs including silt fencing or similar methods along the bank would reduce this effect.

Stormwater Inputs and Treatment

The proposed project would increase impervious surface areas by about 32.4 acres, about 6.7 acres of which are within 300 feet of the Santa Clara River. Increased impervious surfaces could increase stormwater inputs to adjacent water bodies. If sediments and contaminants are transported in stormwater from new roads into the Santa Clara and Virgin Rivers, this could cause direct effects to listed fish. Roadway pollutants of concern include sediment, hydrocarbons, and metals. The direct effects from contaminants would depend on the specific contaminant, the quantity discharged, its ability to reach fish-bearing waters, and the timing of such releases with respect to specific life stages. Hydrocarbons are the primary concern and can be lethal in a sufficient quantity. Both the dissolved and hydrophobic fractions of fuels and oils can be transported long distances downstream. Also of concern is the introduction into waterways of metals, which are toxic to most fish and can delay or inhibit egg development in some species.

Pollutant Analysis

Pollutant loading to the Santa Clara River resulting from the Dixie Drive Interchange project, including overwater structures and the development of Dixie Drive, was evaluated as part of the Environmental Assessment for the project. That evaluation determined that there would be no adverse impacts to water quality from runoff associated with new impervious surfaces. Specific constituent analyses are presented below.

Heavy-Metals Analysis. FHWA's numerical water quality model was used to quantify the impacts of metals in stormwater. The model is explained in two FHWA research documents: FHWA-RD-88-006, *Pollutant Loadings and Impacts from Highway Stormwater Runoff* (FHWA 1990), and FHWA-RD-96-095, *Retention, Detention, and Overland Flow for Pollutant Removal from Highway Stormwater Runoff* (FHWA 1996). Data for the model were obtained from the EPA STORET database, which was accessed online. The average river flow rate was determined by reviewing data from field measurements by the Utah Division of Water Quality that were taken on the Santa Clara River between 1977 and 2006 and on the Virgin River from 1984 to 2006. These data were the most recent data available. Background concentrations of copper, lead, and zinc were obtained by reviewing UDWR data from the same period.

Table 5 and Table 6 below present the estimated pollutant removal rates and the modeled in-stream concentration of each pollutant in the Virgin and Santa Clara Rivers. Concentrations are shown in milligrams per liter, or mg/L. As shown in the tables, the modeled concentrations would not exceed the numeric water quality standards or numeric criteria associated with beneficial uses of the Santa Clara or Virgin Rivers. Therefore, the proposed action should not affect the beneficial-use classes for either river, including those uses associated with protection of warm-water fish.

Table 5. Effects of Detention Basins on Water Quality and Water Quality Results for the Virgin River

Pollutant	Percent of Pollutant Removed by Detention Basin	Resulting Concentration (mg/L)	Numeric Criteria for Beneficial-Use Class 3C (mg/L)[a]
Copper	24%[b]	0.012	0.048
Lead	36%[b]	0.003	0.284
Zinc	18%[b]	0.047	0.379

[a] Utah Administrative Code R317

[b] FHWA 1996, 72

Table 6. Effects of Detention Basins on Water Quality and Water Quality Results for the Santa Clara River

Pollutant	Percent of Pollutant Removed by Detention Basin	Resulting Concentration (mg/L)	Numeric Criteria for Beneficial-Use Class 3C (mg/L)[a]
Copper	24%[b]	0.022	0.048
Lead	36%[b]	0.005	0.284
Zinc	18%[b]	0.102	0.379

[a] Utah Administrative Code R317

[b] FHWA 1996, 72

Increases in TDS Due to Construction. The proposed action could increase the amount of total dissolved solids (TDS) in receiving waters during project construction. However, the required Utah Pollutant Discharge Elimination System (UPDES) permit would include erosion-control measures such as silt fences that would minimize TDS impacts.

Increases in TDS Due to Salt Application. The greatest expected effect to water quality is from the application of salt to roads during winter storms. However, the project is located in an area with very few days at or below freezing. Therefore, very little, if any, de-icing chemicals are anticipated to be used on the constructed surfaces of the Dixie Drive Interchange project.

Impaired-Waters Analysis. The impaired reach of the Santa Clara River exceeds the numerical criterion for temperature. The temperature TMDL might not be warranted because only a few recent readings have exceeded the numeric standard. A de-listing of the temperature impairment for this reach has been recommended (Utah Division of Water Quality 2004). The action area is already a developed, urban setting, and the project would not clear any shading riparian vegetation or structures that would lead to direct heating of the stream. Therefore, the proposed action is not anticipated to have any direct impacts to temperature in the Santa Clara or Virgin Rivers. Nutrient (nitrogen and phosphorus) loading

and turbidity are the most common indirect causes of excess temperatures in streams. Nutrients are not common runoff constituents from highways. Increased turbidity could result from additional TDS loading, but TDS loading from the project is expected to be minor.

The impaired reach of the Santa Clara River also exceeds the numerical standard for selenium. Selenium is not a common constituent of highway runoff (FHWA 2003), and direct impacts to the Santa Clara River from selenium loading are not expected.

Stormwater Treatment

Proposed stormwater treatment is anticipated to reduce or eliminate stormwater inputs and their associated contaminants, unless there is an unforeseen direct spill of sufficient quantity into the water bodies. For new roadway construction, it is typically UDOT's practice to direct stormwater to the city sewer system. UDOT plans to discuss this with City personnel soon to assess the feasibility of treatment using existing systems. If routing stormwater to city sewer systems is not feasible, a new storm drain system would be constructed to collect stormwater from new impervious surfaces. The system would include curbs, gutters, catch basins, pipelines, and detention basins. Detention basins would reduce storm flow peaks and velocities; would reduce the levels of total suspended solids (TSS), TDS, and metals from highway runoff; and would help prevent stormwater runoff from increasing the temperature of receiving streams by slowly releasing possibly warmer runoff into receiving water bodies.

Detention basins would be designed according to the standards of the Utah Division of Water Quality by incorporating oil-skimming devices and grease traps and by providing 30 minutes of detention time to adequately capture sediment and pollutants before discharging stormwater.

Additionally, a Storm Water Pollution Prevention Plan (SWPPP) would be developed and incorporated into the final design plans of the project, and a Notice of Intent form would be submitted to the Division of Water Quality prior to construction of the project. Short-term impacts to water quality would be minimized by implementing UDOT's BMPs.

Accidental Discharge of Contaminants

The unintentional introduction of petroleum products during construction adjacent to the Santa Clara River could negatively affect the growth, reproduction, and survival of any Virgin River chub that are present in the action area. Sources of possible fuel and oil spills or leakage into the Santa Clara River channel include heavy equipment and products stored onsite throughout the duration of the project. The lead agencies have established specific impact-

minimization measures regarding storing fuel, fueling equipment, and containing spills (see Section 7.0, Impact Avoidance and Minimization Measures). These measures should reduce or eliminate the potential for spills and thereby reduce or eliminate any effects to this listed species.

Wet concrete, if it comes in contact with stream water, can increase pH and release carbonate, both of which are toxic to fish under certain conditions. However, this risk would be minimized since all concrete forms associated with overwater supports would be properly cured “in the dry” prior to anticipated high-flow events. Further, to reduce the magnitude and effects of erosion and sedimentation, an SWPPP would be developed for this project that would identify BMPs to be implemented during construction. Such SWPPPs typically include erosion-control measures and a requirement to refuel vehicles and equipment outside the active channel and floodplain.

Direct Effects to Critical Habitat

Based on the analysis in Section 6.1.1, the proposed action could affect the water PCE (see Section 5.1.2, Critical Habitat) in that turbidity and contaminants could temporarily increase downstream in occupied critical habitat, including the Virgin River near the confluence with the Santa Clara River. However, though construction and operation of the proposed action could affect the water quality of the Virgin River, the proposed action is unlikely to adversely affect critical habitat given the distance (0.3 mile) of the Virgin River from the I-15 Santa Clara River bridge crossing. Long-term effects to the hydrologic regime or existing flood events are not anticipated.

The proposed action should have no effect on the physical habitat PCE, particularly since spawning has not been documented in the action area. The addition of riprap along portions of the Santa Clara River and the subsequent creation of evading habitat for invasive species should have no effect on the biological environment PCE in the Virgin River.

6.1.2 Indirect Effects

Indirect effects on the Virgin River chub include effects of the proposed action on the physical environment inhabited by the species downstream of direct construction areas but still within the action area (that is, downstream of the predator exclusion dam near the confluence of the Virgin and Santa Clara Rivers). Construction and operation of the proposed Dixie Drive project could have the following indirect effects:

- Loss of riparian vegetation, resulting in changes in erosion and sedimentation rates and nutrient flow to the Virgin River, ultimately resulting in long-term habitat alteration
- Long-term alteration of stream flows and associated hydrologic processes due to (1) the addition of armoring adjacent to the Santa Clara River, (2) the removal of the Tonaquint Bridge, and (3) the addition of new piers to support reconstruction of the I-15 bridge and two new on and off ramps over the Santa Clara River

These effects, if they occur, would be largely mitigated by the included impact-minimization measures (see Section 7.0, Impact Avoidance and Minimization Measures). The individual indirect effects are discussed below.

Increased Sedimentation Due to Loss of Riparian Vegetation

Removing riparian vegetation could increase the levels of suspended sediments. Such increases can reduce light penetration, inhibit primary production, diminish visibility and increase predation, abrade and clog fish gills, prevent feeding by sight feeders, stop migration, and cause any fish in the area to avoid the disturbed reaches of the river. These impacts could disrupt normal behavior and cause Virgin River chub to avoid available habitat, lose foraging opportunities near the project area, and delay or prevent movement to spawning habitat in other reaches of the river.

In the unlikely case that Virgin River chub are present in the Santa Clara River portion of the action area, increased sedimentation could cause fish to temporarily disperse from an area. However, high levels of turbidity are common in this river system, and sedimentation would not likely be significant enough to cause harm to individuals. For fish in the Virgin River portion of the action area, due to the distance (0.3 mile) of the Virgin River from proposed activities adjacent to or over the Santa Clara River, impacts to Virgin River chub due to increased sedimentation and turbidity related to loss of riparian vegetation or other sediment-producing actions are likely insignificant.

Long-Term Effects to River Hydraulics

Floodplain Armoring and Interchange

By armoring the bank along the proposed Dixie Drive alignment, the project would prevent erosion of the channel bank from adding sediment to the river. The river might "compensate" by eroding sediment from the opposite (right) bank or from the channel bed (degradation). However, these processes can be reduced by maintaining the width and sinuosity of the active channel corridor.

Erosion and sedimentation could also increase due to the construction of proposed piers to support reconstructed portions of the mainline I-15 bridges and on and off ramps connecting I-15 to Dixie Drive. Armoring could also be necessary to protect new bridge piers during extreme flows. During extreme high flows, scouring could occur at the bases of the new piers that are located below the OHWM, which would transport fine-grained materials to the Virgin River. As currently designed, one new pier could be installed in the Santa Clara River channel, while three new piers would be installed in the floodplain below the OHWM.

Because two existing in-water piers support I-15, the river hydraulics and channel morphology have already been altered in this area. Adding new piers could slightly increase constriction of flow at this point, but the effects would not likely be adverse considering the existing conditions and the fact that only one of the new piers is proposed to be located within the active flow of the channel. Although all new piers would be positioned parallel to the flow to reduce scouring, placing additional piers could increase scouring of the adjacent floodplain during high flows. Because the bed and bank materials in the vicinity of the existing I-15 span are sand and gravel, an increase in scouring could transport more fine-grained material downstream to the confluence of the Virgin River. Such effects would likely be restricted to periods of high flow when the river swells following storms. Any increase in sediment input to the Virgin River would not likely be measurable compared to existing conditions, so the additional sediment would not likely affect Virgin River chub or their habitat. Since flashy hydrology and high turbidity are characteristics of both the Santa Clara and Virgin Rivers, adverse affects are highly unlikely.

Tonaquint Bridge Removal

The removal of the Tonaquint Bridge would have both geomorphic and hydraulic benefits to the reach. The bridge is highly undersized for large-magnitude flood events (such as 100-year or 50-year floods). Over time, this condition has constricted the Santa Clara River flow, effectively "fixing" the river to a constricted migratory path, interfering with the river's natural ability to disperse energy, and creating an imbalance of flow upstream and downstream of the

bridge. Upstream of the bridge, velocities are slowed and fine sediments are deposited, effectively raising the streambed elevation and creating a gradient shift. Downstream of the bridge, water moves at higher velocities, resulting in bed degradation and scouring.

Removing the Tonaquint Bridge would eliminate the constriction point and allow the river to return to its natural equilibrium over time. It is likely that sediment deposited upstream of the bridge would redistribute downstream, typically over a few seasons or a few large flow events. Depending on how quickly the redeposition occurs (considering sediment size, flows, etc.), the bridge location could become a nick point, with some downcutting and erosion of river banks over subsequent years. However, the river gradient in the vicinity of the bridge should equalize over time as upstream sediments fill scour pockets downstream. This should result in more efficient and natural flow conveyance and sediment transport through the reach and could improve flooding and erosion problems upstream and downstream of the structure over time as the river re-establishes equilibrium. Based on this expected condition, Virgin River chub, if present in the Santa Clara River, could benefit from bridge removal through improved water quality and flow conditions.

6.1.3 Interdependent and Interrelated Activities

Mitigation measures to compensate for impacts to the Southgate Golf Course would be part of the proposed action. A parcel of land currently zoned as farmland upstream of Tonaquint Drive (see Figure 2 above, Proposed Actions Associated with the Dixie Drive Interchange Project) is proposed as the mitigation area. Although the lead agencies have not defined the construction activities associated with replacing portions of the golf course directly affected by the new road, the agencies anticipate that actions immediately adjacent to the river would follow the project's impact-minimization measures (see Section 7.0, Impact Avoidance and Minimization Measures) to reduce adverse effects to the aquatic environment. In addition, new projects would be subject to the regulations of city and state codes with respect to working along an active river channel.

Mitigation for impacts to the riparian corridor due to armoring, as well as impacts to the Hilton Drive Trail, would likely take place on land purchased in St. George; however, the location of mitigation areas has not been determined at this time. It is likely that any mitigation actions would include enhancing riparian vegetation to compensate for converting lost habitat and usable trails. With the exception of removing Tonaquint Bridge, mitigation actions would not likely involve in-water work in the Santa Clara River. Therefore, effects to aquatic species would be limited to possible sedimentation during activities in and adjacent to the floodplain. Such effects would be local and temporary and would

not likely result in measurable increases in sedimentation to the Santa Clara or Virgin Rivers. The long-term benefit of riparian enhancement, including increased allochotonous input; the addition of overhanging vegetation; and increased habitat complexity would far outweigh any temporary effects associated with riparian enhancement and associated disturbance along the riverbank.

6.2 Woundfin

6.2.1 Direct Effects

Unlike the Virgin River chub, woundfin have not been collected in the Santa Clara River upstream of the predator exclusion dam and are not known to be present in the system. Therefore, the direct and indirect effects to individual woundfin and their associated critical habitat due to the proposed action would be limited to those actions that could affect the Virgin River at the confluence. Impacts associated with construction activities adjacent to and over the Santa Clara River would have minor, if any, effects on woundfin and associated critical habitat unless water quality impairments (increased sedimentation, for example) are adverse enough to affect the Virgin River. During construction, such effects are unlikely.

6.2.2 Indirect Effects

Indirect effects include increased sedimentation and turbidity associated with increased scouring at new bridge piers placed in the floodplain of the Santa Clara River. During extreme high flows, river flow could scour the bases of the new piers and transport that increased sediment load to the Virgin River. However, it is likely that this is an existing condition given the location of the existing I-15 bridge piers. Increases in scour would not likely be measurable at the confluence of the Virgin River where woundfin are known to be present. Effects to woundfin and associated critical habitat in the Virgin River floodplain are therefore possible, but are unlikely to affect the species on a watershed scale.

6.2.3 Interdependent and Interrelated Effects

The interdependent and interrelated effects to the woundfin would be the same as those for the Virgin River chub.

6.3 Southwestern Willow Flycatcher

6.3.1 Direct Effects

The proposed project is not anticipated to result in adverse effects to critical habitat for the southwestern willow flycatcher. The proposed project would not remove or affect any critical nesting or foraging habitat at the I-15 crossing of the Santa Clara River, since the area does not support these activities. Further, the area is already degraded and is characterized by two existing overpasses that span the river. Other land taken for the construction of the interchange either has existing roads or structures or is currently maintained as a golf course and is not considered habitat for this species.

However, the proposed project could directly affect the southwestern willow flycatcher because increased noise levels from project construction could have direct effects on the individuals. The noise analysis of the worst-case scenario, use of the pile driver at the Santa Clara River crossing, shows that the confluence area would have a noise level of between 66 and 76 dBA (decibels on the A-weighted scale) during construction (see Figure 6 below). These temporary construction activities could deter migrating flycatchers from using the Santa Clara River as a travel route in the action area during the construction period. However, because this species is highly mobile, other entries into the Santa Clara River valley, though possibly less desirable, would still be available to the species. Temporary construction noise could also affect the movement of southwestern willow flycatchers within the Virgin River confluence area by deterring flycatchers from using the area during construction.

Once the project is constructed, any permanent increases in noise levels from vehicle traffic at the interchange would be minor (1 dBA) compared to the current noise levels from the existing traffic along I-15 (see Figure 7 below). Also, traffic on the new structures (interchange ramps and connecting roads) would travel at much lower speeds and therefore would produce lower noise levels than the high-speed traffic on I-15.

Figure 6. Results of the FHWA Roadway Construction Noise Model

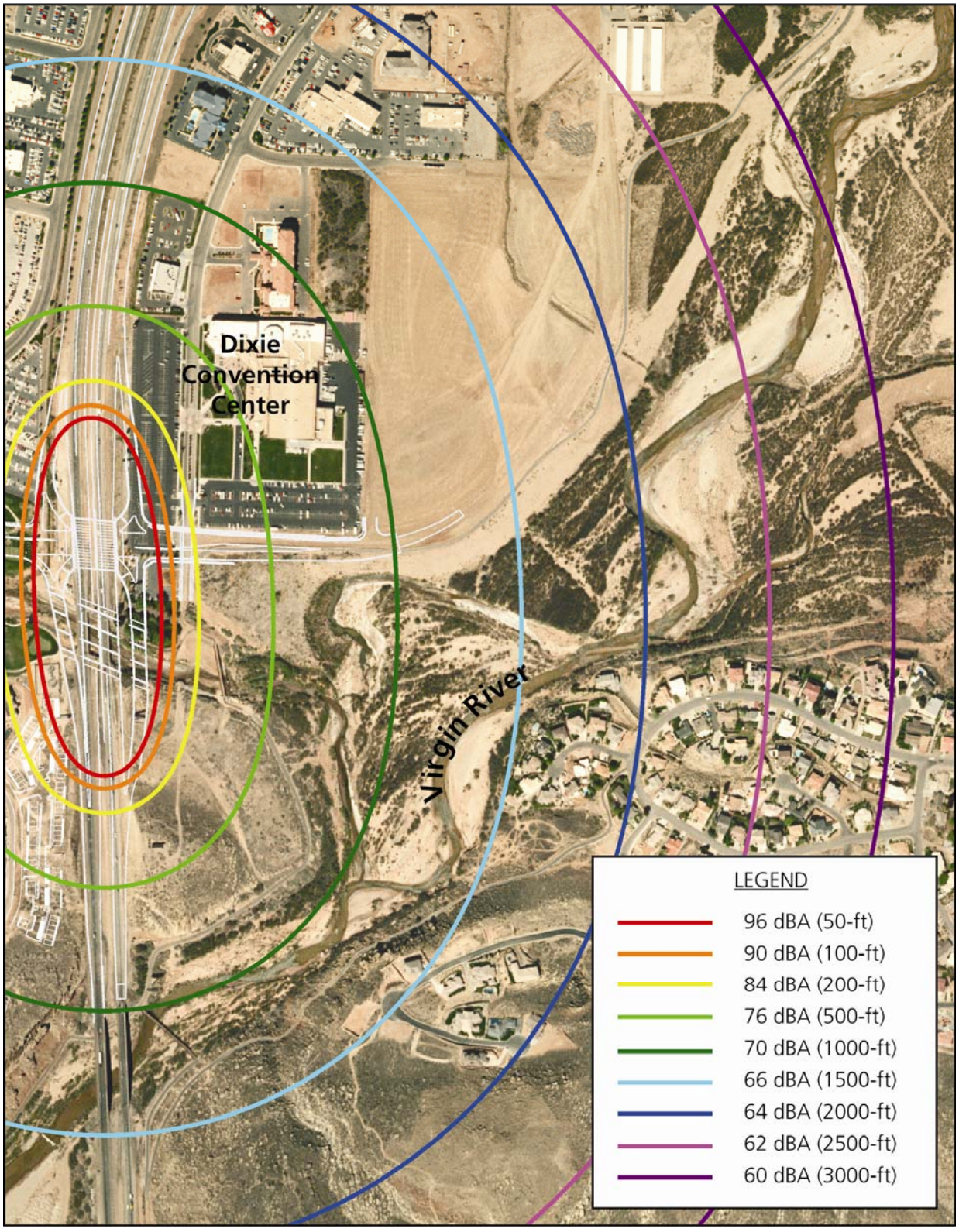


Figure 7. Existing and Future Noise Levels

6.3.2 Indirect Effects

The goal of the Dixie Drive Interchange project is to relieve existing and future congestion on the Bluff Street interchange and is not expected to induce growth in the area around the improvements. Therefore, the proposed project would have no growth inducing indirect effects on either critical habitat or individual southwestern willow flycatchers.

6.3.3 Interdependent and Interrelated Activities

Removing the roadway and bridge at Tonaquint Drive could cause temporary construction-related impacts in one section of the Santa Clara River. This activity could temporarily deter migrating flycatchers from using that section of the Santa Clara River during demolition and construction of the structures at that location. However, such effects would be temporary, and removing the bridge would benefit native species and habitats, including those used by the southwestern willow flycatcher.

Mitigation measures to reduce impacts to the Southgate Golf Course would be part of the proposed action. Although UDOT has not defined the construction activities associated with replacing portions of the golf course directly affected by the new road, UDOT anticipates that this work would have no effect on southwestern willow flycatcher. The golf course mitigation property is currently developed as farmland, and its loss would not affect flycatcher habitat.

6.4 Yellow-Billed Cuckoo

6.4.1 Direct Effects

Direct effects from the proposed project would be the same as for the southwestern willow flycatcher with a minor exception: the proposed project would not remove or affect any critical nesting habitat, as none has been designated for the yellow-billed cuckoo.

6.4.2 Indirect Effects

The proposed project would have no indirect effects on the individual yellow-billed cuckoos.

6.4.3 Interdependent and Interrelated Activities

The interdependent and interrelated activities that would affect the yellow-billed cuckoo would be the same as those for the southwestern willow flycatcher.

7.0 Impact Avoidance and Minimization Measures

During construction, the amount of sediment entering the Santa Clara River could increase due to stormwater runoff from disturbed ground. In addition, placing bridge piers, removing Tonaquint Bridge, and stabilizing the bank of the Santa Clara River would require work directly in or adjacent to the waterway. The impact-minimization measures included in the proposed action are intended to minimize impacts to listed species and their habitat. The following actions and protective measures have either been considered in the design or will be taken by contractors and crews to minimize impacts to riparian and riverine habitat during construction:

- Design new piers associated with reconfiguring the I-15 mainline bridges and constructing the on and off ramps at the interchange to minimize scour and hydraulic modifications in the Santa Clara River to reduce sedimentation potential. All new piers will be positioned parallel to flow to reduce scouring.
- Provide erosion control on all cut-and-fill slopes by applying compost or mulch to the slope or through other means. Establish native vegetation on the slope where possible. Where possible, provide vegetated filter strips.
- If feasible and not cost-prohibitive as determined by UDOT, minimize large equipment (such as cranes) working in the main flow or immediately adjacent floodplain of the Santa Clara River.
- Identify and minimize the potential for accidental spills of hazardous materials by implementing BMPs and measures specified in the SWPPP. Develop a spill prevention, control, and countermeasures (SPCC) plan and follow it during construction. This plan will identify riparian zones and drainages and describe measures to ensure protection. UDOT will implement a plan to identify and protect sensitive resources through applicable BMPs. The SPCC and SWPPP will address the following issues:
    - List specific requirements for refueling construction equipment near riparian zones and water bodies, which could include washing equipment (removing noxious weeds and seeds and petroleum products before moving it onsite), not refueling within 100 feet of water bodies, and steps to control, contain, and clean up any spill that occurs.
    - Designate riparian zones and drainages in the construction area that should be avoided by staking and flagging them.

  - Ensure that equipment operating near aquatic habitat, contain a hazardous materials response kit to prevent impacts to aquatic habitat. Use equipment mats to prevent leakages from entering the river.

- Prior to construction, the contractor will define the area needed for construction activities in the Santa Clara River and adjacent floodplain. This area and the immediately surrounding area will be surveyed by a qualified biologist for sensitive resources. Areas that are determined to have sensitive resources and that are not needed for construction equipment will be flagged to restrict access. If sensitive resources are found in the construction area, the biologist will work with the contractor to determine if avoiding the resource is feasible.
- If the city stormwater system is not used, provide detention ponds for water quality treatment where runoff must be detained to reduce its peak flow rate. Detention basins will be designed according to the standards of the Utah Division of Water Quality by incorporating oil-skimming devices and grease traps and by providing 30 minutes of detention time to adequately capture sediment and pollutants before discharging stormwater. Detention basins or ponds will be designed to store runoff and discharge it within about 6 hours during a storm event with a 10-year frequency or less to minimize solar heating of the ponded water.
- A UDOT Certified Environmental Control Supervisor (ECS) will monitor all environmentally sensitive areas, BMPs, and erosion-control devices.
- To minimize adverse effects to the aquatic environment in the vicinity of the proposed in-water construction, dewater the area behind cofferdams. The in-water work described in Section 6.1.1, Direct Effects, will be used to remove fish from the construction area. If fish are removed, the biologists will prepare a report for USFWS and UDWR that summarizes the number of fish handled, species, and individual lengths. After construction, cofferdams or flumes will be removed incrementally to minimize pulses of sediment downstream.
- Pile driving will be accomplished using a vibratory driver. Impact drivers will be used only to proof piles, or if geologic conditions make vibratory installation infeasible. Piles will be driven “in the dry” behind cofferdams or within reaches dewatered using bypass flumes.
- Tonaquint Bridge will be removed during periods of low river flow to minimize sedimentation and turbidity downstream.

- All new concrete used during construction that could come in contact with the Santa Clara River will be properly cured so that no hazardous materials from the concrete could leach into the surface waters.

In addition, the following BMPs will be implemented:

- Best management construction practices will be used to limit the release of fine sediment into the Santa Clara River during construction in areas adjacent to the river. BMPs include the use of silt-free fill, fill free of waste/pollutants and noxious weeds and seeds, riprap (if used for stabilization), and silt barriers.
- If bank stabilization and erosion-control structures are necessary, design them to maintain or enhance natural stream function (sinuosity, gradient, hydrology, and sediment transport). If riprap is used, it will be in-planted with native riparian vegetation, potentially including willows.
- Stockpile areas will be approved by UDOT or a qualified biologist prior to construction. Stockpile areas will avoid the river channel and riparian vegetation.
- Sort excavated soils into mineral soils and top soils. When backfilling a disturbed site, place top soils on top to provide a seed bed for native plants.
- The contractor will follow noxious weed mitigation and control measures identified in the most recent version of UDOT's Special Provision Section 02924S, Invasive Weed Control.
- Revegetate disturbed areas (work sites, entrance and exit locations, stockpile sites, pits) when appropriate after construction with native plants or certified weed-free native seed. Monitor the planting for success. If the planting fails, reseed or replant it.

8.0 Determination of Effect

Determinations of effect and their associated rationale are presented by species below. Table 7 presents a summary of determinations for each species and its critical habitat, if designated.

Table 7. Summary of Effects Determinations for Listed and Candidate Species

Species	Effect Determination	Critical Habitat Effect Determination
Virgin River chub	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Woundfin	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Southwestern willow flycatcher	May affect, not likely to adversely affect	No effect
Yellow-billed cuckoo	Not likely to affect populations or suitable habitat	Not applicable

8.1 Virgin River Chub

8.1.1 Species

Based on the information presented in this biological evaluation the proposed project *may affect, but is not likely to adversely affect,* Virgin River chub.

The proposed project *may affect* Virgin River chub because:

- A transient Virgin River chub was reportedly captured in the Santa Clara River by UDWR biologists just above the Bloomington Diversion in the vicinity of proposed work along the river in the early 2000s.
- Installing new piers at the I-15 bridge location could increase scouring adjacent to the piers during high flows, which would transport more fine-grained sediments downstream of piers in the Santa Clara River (potentially to the Virgin River).
- If Virgin River chub are present, work adjacent to the Santa Clara River channel could disturb individuals through the temporary introduction of sediments and increased turbidity associated with construction along the banks and within the floodplain. These actions include:
  - Installing new piers to support reconstructed portions of the I-15 mainline bridges and constructing the Dixie Drive southbound on ramp and northbound off ramp over the Santa Clara River
  - Removal of Tonaquint Bridge
  - Adding armoring along the floodplain associated with Dixie Drive protection

The proposed project is *not likely to adversely affect* Virgin River chub because:

- Numerous surveys conducted by UDWR biologists over the past few years have not collected any Virgin River chub from the Santa Clara River. Therefore, if Virgin River chub are present in the Santa Clara River, they occur in very low numbers.
- Spawning habitat is not present in any portion of the action area.
- UDOT would reduce sedimentation caused by construction adjacent to the river channel, or by hydraulic modifications due to adding armoring in the floodplain, installing new bridge piers, and removing the Tonaquint Bridge, by following impact-minimization measures.
- The Virgin River is about 0.3 mile downstream of the nearest proposed action in the aquatic portion of the action area (pier construction associated with the interchange over the Santa Clara River). Given existing conditions, it is unlikely that installing new bridge piers would lead to a measurable amount of increased sediments at the confluence with the Virgin River. It is highly unlikely that the proposed project actions would affect fish in the Virgin River.
- Pollutant analysis indicates that the project would result in no adverse effects due to stormwater runoff in either river system.
- Impacts would be local, so they would have no significant impacts on prey species.

8.1.2 Critical Habitat

Construction would occur adjacent to and over the Santa Clara River, which is not designated as critical habitat for the Virgin River chub. The proposed action *may affect, but is not likely to adversely affect*, critical habitat at the confluence and floodplain of the Virgin River based on the following rationale:

- Critical habitat is designated only in the Virgin River and its adjacent floodplain. Due to the existing altered hydraulic condition of the Santa Clara River at the I-15 bridge location, the addition of new piers should result in a minimal increase in scour at the base of the piers in the floodplain. It is unlikely that scouring effects would be measurable downstream to the confluence with the Virgin River. However, during extreme flow events, increased sediments could temporarily affect the water PCE as related to turbidity (see Section 5.1.2, Critical Habitat). Further, effects to upstream hydraulics in the Santa Clara River could modify flow into the Virgin River and alter floodplain dynamics near the confluence.

- Proposed stormwater treatment would reduce the level of contaminants that could enter the Santa Clara and Virgin Rivers to levels that meet state water quality standards.
- Construction and use of elements of the Dixie Drive Interchange project could have minor effects on the hydrologic regime, Virgin River floodplain, prey availability, and fish access to existing habitats.

8.2 Woundfin

8.2.1 Species

Based on the information presented in this biological evaluation, the proposed project *may affect, but is unlikely to adversely affect*, woundfin that could be present in the action area.

The proposed action *may affect* woundfin because:

- Woundfin are known to be present in the action area in the reach of the Virgin River near the confluence with the Santa Clara River. Indirect effects following construction of the proposed action could include hydraulic and hydrogeomorphic modifications to flow in the Santa Clara River, which would increase sediment loading to the river. The increase in impervious surfaces adjacent to and over the Santa Clara River could also increase pollutant loading in the Virgin River.

The proposed action is *not likely to adversely affect* woundfin because:

- All proposed construction in the aquatic portion of the action area would take place within, adjacent to, and over the Santa Clara River. Woundfin are not known to occupy the Santa Clara River. No woundfin have been collected during numerous surveys conducted by UDWR biologists over the past several years. Therefore, any effects to the Santa Clara River associated with construction are anticipated to have no effect on woundfin.
- Spawning habitat is not present in the action area (which includes the confluence of the Virgin River where woundfin are known to occur).
- New impervious surfaces would be treated, and runoff is not anticipated to have any adverse effect on the water quality of the Virgin River, where woundfin are present.
- The Virgin River is about 0.3 mile downstream of the nearest proposed action in the aquatic portion of the action area (pier construction associated with interchange over the Santa Clara River). Given existing conditions, it is unlikely that installing new bridge piers would

measurably increase sediments at the confluence with the Virgin River. However, during extreme flow events, the proposed project actions could increase sediment loading to the Virgin River due to upstream hydrogeomorphic changes in the Santa Clara River.

8.2.2 Critical Habitat

Construction would occur adjacent to and over the Santa Clara River, which is not designated as critical habitat for woundfin. The proposed action *may affect, but is not likely to adversely affect,* designated woundfin critical habitat at the confluence of the Virgin River based on the same rationale as presented for Virgin River chub critical habitat.

8.3 Southwestern Willow Flycatcher

8.3.1 Species

The construction of the Dixie Drive interchange *may affect, but is not likely to adversely affect,* the southwestern willow flycatcher. The rationale for this determination is based on the following information specific to the action area:

- Any individuals in the vicinity of the bridge construction could be temporarily disturbed by the noise from construction (primarily from the pile driving); however, no flycatchers are known to reside in the action area.

The proposed action is *not likely to adversely affect* southwestern willow flycatcher because:

- No marginal nesting or foraging habitat for this species would be removed or significantly altered.
- The closest nesting habitat is 1.2 miles from the bridge construction, well beyond the influence of any temporary construction noise effects.
- Expected noise levels after construction are predicted to be similar (±1 dBA) to existing noise in the confluence area and upstream along the Virgin River.

8.3.2 Critical Habitat

The proposed action would have *no effect* on southwestern willow flycatcher critical habitat based on the following rationale:

- UDWR and USFWS personnel have stated that designated critical habitat in the action area is of a lower quality than in other areas to the north (HDR 2007a, 2007b). Therefore, the habitat in the action area might not support PCEs necessary for critical habitat.
- Designated critical habitat would not be directly affected by proposed construction activities adjacent to or over the Santa Clara River.
- Expected noise levels after construction are predicted to be similar (±1 dBA) to existing noise levels in the Virgin River critical habitat.

8.4 Yellow-Billed Cuckoo

The construction of the Dixie Drive interchange is *not likely to affect populations or suitable habitat* for the yellow-billed cuckoo. The rationale for this determination is based on the following information specific to the action area:

- No marginal nesting or foraging habitat for this species would be removed or significantly altered.
- There are no well-established and recent nesting areas within a few miles of the project location, only historic nesting along some parts of the Virgin River.
- Any individuals in the vicinity could be temporarily disturbed by the noise from construction; however, no cuckoos are known to reside in the action area.
- Expected noise levels after construction are predicted to be similar (±1 dBA) to existing noise in the confluence area and upstream along the Virgin River.

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